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ABSTRACT

School libraries are changing due to developments in information technology, teaching and learning methods, and society. A meeting of 28 experts from 16 countries was convened to better understand current trends in tertiary libraries and the effect of these trends on the demand, organization, and design of libraries. Participants agreed that the library sets an image for tertiary education institutions that attract students, teachers, and researchers; that it is networked requiring professional development; that its role is to protect cultural heritage; and that it must be flexible to meet the diverse needs of today and into the future. Presenters embraced various images of future libraries that reflected new delivery mechanisms available through the use of Internet and other networked applications; some argued for flexibility in terms of building design or organizational and delivery process. Many models were also reported on or presented in which the tertiary library expands its service to multiple education institutions, lifelong learning, the corporate sector, and the community in general. This document represents the final report from the meeting covering the new ways of learning and teaching that may affect libraries; information technology and communications; library management; and library facility planning, design, and management. (Contains 31 references.) (GR)

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ED 460 585

FINAL REPORT

OECD Experts' Meeting on

Libraries and Resource Centres for Tertiary Education

by the Programme on Educational Building and the Programme for Institutional Management in Higher Education

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Paris, 9-10 March 1998

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EXECUTIVE SUMMARY

Historically thought to be the 'centre' of tertiary education, the library is changing with developments in information technology, teaching and learning methods and changes in society. Coupled with budget pressures, demands for expansion and increased expenditures, the maintenance of library services requires examining new methods of delivery and use. Overall, with regard to the future of tertiary education, the library is an important institution to investigate.

This document reports on a meeting of experts organised by the OECD Programme on Educational Building (PEB), in co-operation with the OECD Programme on Institutional Management in Higher Education (IMHE). The meeting, entitled 'Libraries and Resource Centres for Tertiary Education', was held in Paris on 9th and 10th March 1998. The goal of the meeting was to better understand current trends in tertiary libraries and the effect of these trends on the demand, organisation and design of libraries. The complementary concerns of these two programmes were presented as themes for the meeting.

Twenty-eight experts participated, representing sixteen countries: Albania, Australia, Austria, Belgium, Canada, Denmark, Estonia, Finland, France, Hungary, Italy, Mexico, the Netherlands, Portugal, Switzerland and the United Kingdom. The meeting brought together professionals from the many diverse areas involved in the building, management and use of tertiary libraries. The participants included architects, university librarians and library directors, professors, information technology experts, institutional managers and government representatives.

The purpose of this meeting was to develop a better understanding of the relationship between changes that are taking place within the library profession (particularly with the use of information technology) and its effect on the demand for higher education buildings and their design, organisation and management. The meeting was organised as a series of case-study presentations, discussions and group work by the experts over the two days. This report summarises the case studies and observations of the experts and relates them to other examples of libraries recently constructed or renovated.

In addition to case-study presentations, several general reports were presented. These included an overview of the issues raised for the experts meeting (Susan Stuebing); a technology overview (Bernard Levrat) and a survey on physical use indicators conducted for the experts meeting (Cees Anton de Vries).

Conclusions

With regard to the future design and organisation of libraries, four general conclusions were agreed to by the experts:

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1. THE LIBRARY SETS AN IMAGE: New and renovated libraries will provide a visible, identifiable and physical image for tertiary education institutions to attract students, teachers and researchers.
2. THE NETWORKED LIBRARY AND PROFESSIONAL DEVELOPMENT: The new library is integral to learning by educating towards a critical use of networked resources. The need for staff and students to be trained or re-trained is recognised as critical and must receive adequate funding.
3. THE ROLE OF THE LIBRARY: Protecting cultural heritage remains one of the fundamental roles of libraries. Librarians are faced with a new mission to guide students, professors and whenever possible, the whole community in the digital world.
4. FLEXIBILITY: New library facilities should include as much flexibility as possibility to meet the needs of today and the future, particularly with concern for rapid and unpredictable technological development.

These global conclusions were supported with more specific conclusions within the focus group discussions which were conducted over the two-day experts meeting.

Perhaps of greater interest are the questions which were raised during this meeting and the concepts which were used to describe the library of the future. Some of the presenters had fully embraced technology and had begun to reframe the role of the library in new terms; in particular these included:

- Market driven library delivery,
- Product based library,
- Knowledge managers,
- One-stop-shop for learning.

These concepts were in part in response to new delivery mechanisms available through the use of Internet and other networked applications. Other presenters expressed caution and held tightly to the concept that the library for tertiary education needs to offer the social context for learning. This dichotomy between the library as a service and social environment, and the library as a delivery mechanism for a range of new products (electronic search engines, electronic publishing, data archives, etc.) did not appear to be a concern to most experts. Both library types were presented as an optional choice without a strong debate from the experts.

However, several speakers made strong arguments for carefully studying the potential for the future, particularly with regard to distance learning opportunities. Pointing toward resource restrictions, these arguments are interesting areas for further research and discussion.

Many experts argued for the need for flexibility within the library. Speakers argued for a briefing process which supported flexibility. Flexibility was discussed in terms of the physical design of the building (to allow for expansion and contraction), and in terms of the organisational and delivery process (particularly reflecting changes in the adoption of electronic delivery and storage systems). The changing role of the library occurs not only with regard to use and adoption of information and communication technology (ICT), but also with regard to definition of the users. Many interesting models were reported on or presented in which the tertiary library expands its service to multiple education institutions, lifelong learning, the corporate sector and the community in general.

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1 Introduction - The Problem

The new models of learning call for a rethinking of the organisation of libraries, the traditional information resource. Traditional universities and open and distance learning institutions are reorienting their resources and methods to create 'virtual campuses' where students can register in one institution and take courses for credit in a variety of ways, such as attending lectures (presential learning) or satisfying requirements through the Internet either in public places or at home.

The planning and renewal of academic libraries and the management of existing ones require a 'multi-focused lens' with an emphasis on envisioning the future. The insatiable demand for information and the pace of change in its content and form suggest dramatic changes for what has been a 'historic' resource (Scherer, 1994).

Role of the library

The role and activities taking place within the academic library appear to be changing. These changes are predicted to affect the organisation of the library as well as the physical building. Historically, libraries have been a research resource supported by a maintained 'physical' collection and archives. Today, the academic library is confronted with developments in technology, dramatically growing traditional collections and increased student and faculty demand.

Learning and library changes

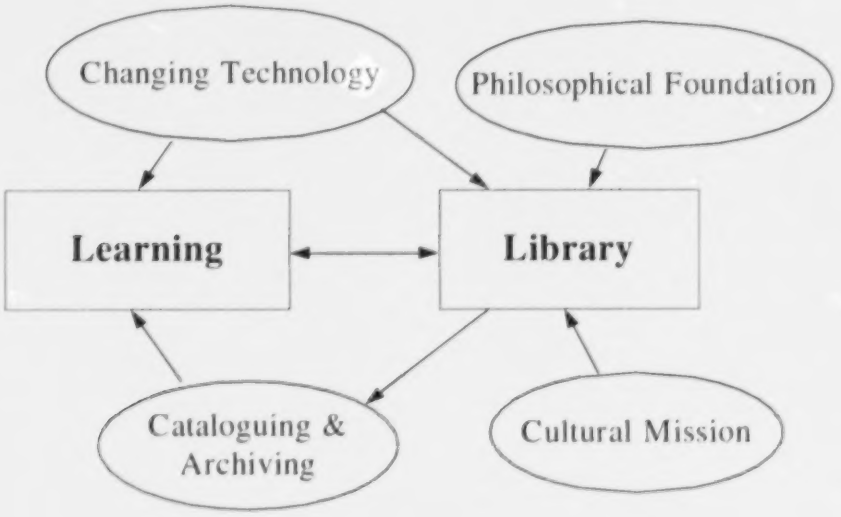
New and more independent 'student centred' learning methods magnify the role of the library in the higher education process. Actually, the concept of the elite university is under attack as pointed out by Bernard Levrat[1]:

"The prevailing Humboldt model which links teaching and research in the same department is undermined by two factors: much research is being done outside the universities and new specialities are required which are best described as borderline between several traditional disciplines -- bio-informatics, ecology, financial mathematical modelling; competition comes from the Internet where whole curricula can be found.

[1] The quotations come from the papers or presentations provided by the experts for this meeting. Bernard Levrat is a computer science professor at the University of Geneva, Switzerland.

The number of students is growing dramatically; their aim is to be prepared for finding a job and for life-long learning rather than acquiring a diploma good for a lifetime. However, a number of values remain attached to the alma mater: the definition and accreditation of curricula, the value of a diploma, the provider of equitable access to resources, the place where people meet, socialise and debate. Libraries are expected to play an important role in the process."

As a result, many universities and other tertiary institutions are questioning the ways in which they use libraries and learning resource centres. The following diagram summarises the influences now impacting on contemporary libraries. **Changing technology** comprises the two most influential factors: computers to present information and telecommunications to retrieve it from a distance. They bring new learning opportunities and force libraries to give more visibility to the resources they manage. But a library should not evolve without having some thought given to its **philosophical foundation**, its reason for being and the advantages it gives its patrons.



The job of **cataloguing and archiving** remains essential. The amount of data generated by computer-assisted document production is enormous. Without libraries, most data would be lost or would not be retrievable for lack of an indexing scheme. University and reference libraries contain invaluable works, part of the heritage of a city or a nation. The new developments should not obscure the **cultural mission** of libraries for which there is no substitute.

Networked archives and copyrights

The library profession has demonstrated leadership in embracing developments and making responding changes to adapt to new methods in electronic information storage, retrieval and processing. However, the availability of documents in digitised form brings a whole set of new problems related to copyrights. Libraries are burdened with policing the copyrights of publishers and the electronic use of intellectual work which can be easily copied. Mounting costs for electronic services and personnel support may result in fee-based usage for library services. Fees for service may challenge historically free libraries and contribute to reducing availability and use.

Library design and organisation

With regard to design, ecological and security considerations, related reports from OECD programmes offer a range of relevant observations and findings. For example, the 'Thematic Review of the First Years of Tertiary Education' (OECD, 1997, p.66) found that 'Acceptance of the value of sensitively designed new buildings and equipment in fostering learning and positive attitudes towards study lies behind some highly imaginative projects visited by review teams in Denmark, Sweden, the UK, the US and Japan. The combination of advanced technology with a welcoming ambience of the multi-purpose complexes, which are increasingly becoming the main centres of institutions, is impressive'.

Within many countries, there is a rise in the number of new library facilities or renovations of libraries. This report on the experts meeting is structured in four sections which are related to key fields or 'disciplines' and issues which affect the library environment.

- Education: new ways of learning and teaching as they may affect libraries;
- Technology: information technology and communications;
- Management: library management;
- Architecture: facilities planning, design and management.

2 Education: New ways of learning and teaching as they may affect libraries

Key Issues:

- *student-centred learning*
- *technology access and training*
- *accessibility*
- *distance learning*
- *relevance to non-OECD countries*

2.1 Overcrowding

The issue of overcrowding, due to the rise in student numbers, was recognised during the recent OECD review of tertiary education as a potential stimulus for improvements in institutions and countries open to change: "Complaints about overcrowding are nothing new... The reviewers were conscious of certain institutional and legal rigidities to say nothing of attitudes and conditions of employment in some countries which seemed to inhibit the kind of day and night, year long use of space and the flexible use of personnel that are marked features of modern dynamic institutions... Space pressures and inadequacies continue and there is a continuing need for new or remodelled teaching and learning spaces and for staff development and training to ensure that full advantage is taken of the potential of new spaces and facilities" (OECD, 1997, p. 25). "The overcrowding debate is relevant...the review team questioned whether the overcrowding issues had actually been addressed, whether any other avenues have really been explored, in terms of the efficient use of resources and facilities and especially of more innovative teaching methods and practices, extended hours of opening and greater use of distance education... Simply opening the doors without changing teaching and learning is not a solution" (OECD, 1997, p. 26). These observations raise questions for PEB: How will PEB tackle the issue of cultural context in space management? Can/should PEB become involved in curriculum design and teacher training?

2.2 Teaching and learning methods

New teaching and learning methods which are more 'student-centred' and research-based are forcing a new focus on the library environment. Some of these methods include problem-based learning where teams of students are given a problem which they must research and solve. For the academic library this may mean accommodating increased research agendas as well as student groups which require the ability to discuss and work together.

There is much uncertainty about how old and new methods of learning will mix to form the learning environment of tomorrow. The best professors will still give lectures in their specialities while others will do mostly counselling and tutoring. Some preliminary studies have shown that the attention span of students in front of a non-interactive screen (or a multi-media wall) is quite short, which speaks against a generalised use of tele-teaching for lecturing, its most useful purpose being to bring high-level presentations and conferences to many places at the same time. More and more often, the requirements associated with traditional teaching methods require an access to Internet, either to participate in discussion groups (e-mail, news groups), to access digitised resources or to interact with programs, computer-based learning materials and simulations.

The OECD report on tertiary education notes that "Thus far, with some elegant exceptions, innovative curriculum designs, teaching and learning strategies have not kept pace with the technologies" (OECD, 1997, p. 107). What will be the impact on building infrastructure when curriculum and teaching/learning methods do actually catch up with technology?

2.3 Libraries as study areas

Ideas about the importance of study have, in some countries such as the Netherlands, reinforced the need for student study areas and a reappraisal of the 'study landscape'. The natural location for this activity is the academic library, but this function of study has often been intended as an individual activity at home. This revised quality of the student learning environment puts pressure on the library environment. Even lectures or seminars may be thought to be an appropriate activity within the library environment thus requiring appropriate facilities.

2.4 Training for accessing information

The most obvious of these new responsibilities is the acquisition of library skills or other training related to accessing information, but, for some higher education institutions, the library becomes a natural place for short-term skill-based instruction to be put into practice within the library environment.

For Jean-Pierre Côté[2]: *"In addition to organising research and providing access to information, the library and its staff must teach a critical approach to the use of these resources. Anyone who has looked for information on the Internet knows how difficult it is to find what one wants and how hard it is to determine its value".*

Who should be responsible for this training -- the library staff, the computer department, or teachers? Should it be included in the students' required curriculum? Some universities no longer provide basic computing resources for word processing (the University of South Australia aims to reduce the provision) -- these are expected to be provided by the students themselves. In other universities there are moves towards requiring students to supply their own portable (notebook) computers as a basic requirement, similar to the more traditional and accepted custom of purchasing textbooks, slide rules and calculators. The problem is then to allow these to be connected to the university network, to download allowed resources and to prevent abuse in the form of pornography, hate mail or 'spamming'.

[2] Director-General of the Libraries Service at the University of Quebec in Montreal, Canada.

Educators also need particular technical support and attention in order to be at ease with information technology and to integrate it into their teaching. Comprehensive catalogues, organised by discipline, of what is available in a given region or a given system can be put on-line. It has been done in Switzerland as a first step towards the implementation of a virtual campus[3].

2.5 Changes in library users

Libraries will increasingly serve a broader, less elite population in OECD countries as a result of distance learning. 'Virtual universities' and on-line compulsory education can make learning more accessible[4]. There are a number of projects joining what several institutions offer. Two well-known examples of consortia come from the United States: The Western Governors University (www.wgu.edu) and the UC (University of California) organisation (www.california.edu/). Traditional distance learning tertiary institutions have also come on-line: the Open University (www.open.ac.uk/) in the United Kingdom, the tele-university of Quebec (www.teluq.uquebec.ca/) and Hagen in Germany. They seek local support for their students in the form of Internet access, facilities for tutoring and access to traditional 'knowledge resources'.

The OECD thematic review of tertiary education found that "relatively few examples of institutions making substantial use of distance education were drawn to the reviewers attention notwithstanding its presence in countries and institutions visited. Distance education, despite its enormous potential, has yet to enter the mainstream" (OECD, 1997, p. 29). What will be the impact on facilities when distance education really does take off?

2.6 Griffith case study

A good summary of the implications for existing and future institutions was given by Janice Rickards[5] in her case study on Griffith University:

"As is the case for many other universities in Australia, adopting a flexible learning approach is one of Griffith's key strategic objectives. In our context, flexible learning is an educational philosophy and a set of techniques by which ways of learning are adapted to learner's needs to achieve greater:

- *learner control over learning,*
- *learner independence and responsibility,*
- *support for learning,*
- *lifelong learning.*

All 13 of Griffith's faculties are addressing this goal with strategies ranging from the widespread development of flexible delivery packages for off campus use to providing choice in delivery mode, scheduling and assessment.

The major initiative moving Griffith towards this new paradigm has been the establishment of a new campus at Logan. All subjects at Logan are offered in flexible mode. The approach at Logan does not represent the distance education paradigm but flexible approaches for both on and off campus students. These flexible approaches involve:

- *less reliance on time-tabled face to face sessions;*
- *more reliance on using flexible learning resources;*
- *flexible space that can be used in different ways;*
- *a very limited number of dedicated spaces;*

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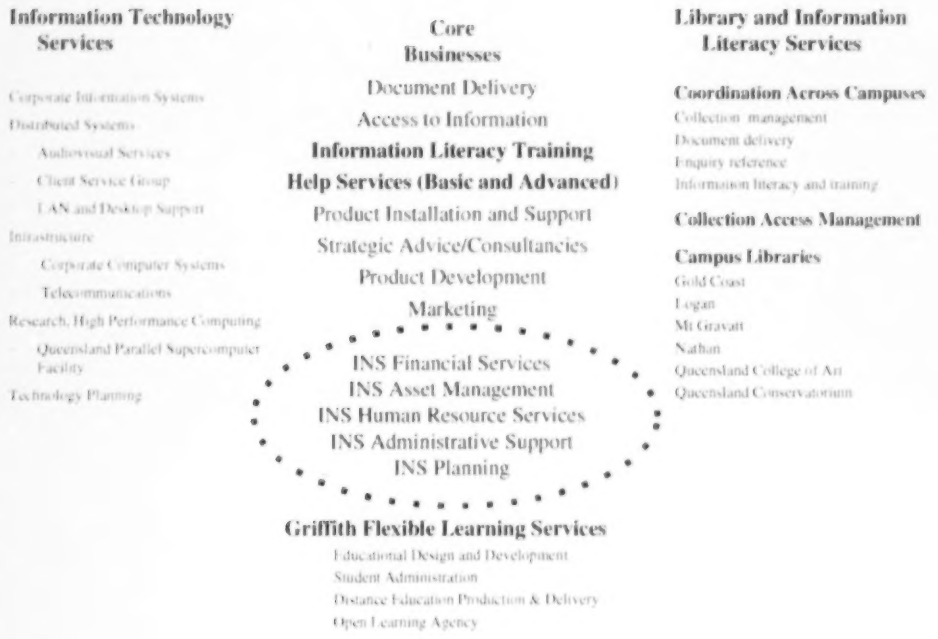
[3] See Swiss projects at http://www.edutech.ch/edutech/index_e.asp.
[4] See France, Ministry of Education at http://www.cned.fr/Presentation/index.htm.
[5] From Griffith University, Queensland, Autralia. Established in 1971, it has 20,000 students and 2,500 staff.

- *core administrative and information services space e.g. collection space;*
- *learning environments -- areas where students access a range of learning resources and activities e.g. quiet areas, video conferencing areas, seminar rooms, computer workstations; these spaces are called learning centres;*
- *dedicated academic areas.*

Conceptually these areas overlap and 'flow' into one another. Whilst there is still a separate library, information services staff support not only the Information Services building but all the learning centres as well (The library and Information Literacy Services (LILS) branch is part of the Division of Information Services (INS), along with Information Technology Services (ITS) and Griffith Flexible Learning Services (GFLS)).

Branches of the Division of Information Services (INS)



One of the most obvious consequences of the move to a flexible learning paradigm is the increased need for computer workstation access. Not only are we developing computer-based learning products, we are also aggressively pursuing a shift from print-based to electronic information resources.

While Griffith does have many separate computing laboratories, we have a mixed approach, with many workstations also being available within libraries. These are found in both open areas and dedicated training rooms. We also provide docking facilities, but there are significant standardisation and support issues (not to mention equity issues) to be resolved before we can move in a wholesale way from workstation provision to student ownership of laptops.

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Twenty-four hour access to workstations within libraries/information services centres can pose interesting design problems, particularly when taking in the need to comply with standards for access to toilet facilities and handicapped access."

2.7 Increasing equity and access to learners

Distance learning is thought to be a potential factor in increasing equity and access to learners, for example bringing more women into the fields of science and mathematics. But to achieve these goals greater investment in information technology and greater co-operation with other institutions at the local, national and international levels will be required. A potential co-ordinating organisation for these activities is the academic library within a greatly expanded mission.

Accessibility and expanding community 'inclusion' is also perceived as a responsibility of today's library. For example The San Francisco Public Library includes a Center for the Deaf and Hearing Impaired and a library for the Blind and Print Handicapped. Its Literacy Center reflects support for lifelong learning. Technology tools, distance learning and communication can complement and support goals to promote accessibility.

Joint academic/public libraries will face their own problems, detailed in the paper presented by Judy Humphreys[6]:

"We have had our share of complaints and 'high emotions' from clients from each sector. Sections of the public have complained that the bright, new, airy building is not as warm and friendly as the 'tin shed', questioned why their money should go to finance USQ and have complained that students are putting their feet on their chairs. From the students' perspective, the library is not quiet when they want to study, the circulation staff do not understand them and the public have borrowed THEIR books when they want them. Despite varied forms of publicity from the first day of operation therefore people did not acknowledge the necessity for differences in service based on the nature of the library's clients.

Although our circulation system cannot cope with providing statistics that differentiate between groups using library materials, we know that the public are using USQ materials as a result of the complaints we have received from community patrons who want their fines waived on overdue university books.

There have been some unusual and inflated notions of what would be available now that the two services had combined. People came looking for the 'university collection' which we had interfiled with the community collection. A teacher was quite upset that the back wall of the library was not covered with print serials because the library had now included the university sector. This person was not impressed with the notion that (a) we collect in disciplines offered at Wide Bay Campus and that (b) our direction was towards electronic journals.

Despite all the ups and downs, the frustrations, the hard work and the stresses, the staff have found that this has been a positive experience and that most of the problems have been associated with factors other than the actual joint-use operation. An evaluation at the end of the second year should confirm the benefits of the joint services.

The factors [she] considered essential to success were:

- *attention to the needs of the stakeholders in terms of opening hours, physical facilities and special needs;*
- *the level of service provided must be equal to or better than that which could be provided in separate facilities;*
- *system wide support for staffing, professional development, advice and financial matters;*
- *a formal agreement endorsed by all co-operating authorities;*

[6] Campus Librarian at the Wide Bay Campus of the University of Southern Queensland in Australia, she co-authored 'A Joint Academic/Public Library: Bringing the Mountain to Mohammed' with Prof. Malcolm Cooper, Campus Principal.

- *full and continued consultation;*
- *the establishment of a Library Management Committee which should make policy rather than become involved in administration.*

In reflecting on the operation of the Hervey Bay Library, the Campus Librarian has been constantly drawn to the 'human' factors (as opposed to the management structure) in the success or otherwise of this project. The Hervey Bay Library experiment will succeed because of the vision and philosophies of the instigators of the joint-use concept, sometimes in the face of opposition from their respective organisations, and the tenacity of the original steering committee in pursuing the overall project to a successful outcome."

A joint academic/public library may be the model of the future especially in a distributed tertiary library system partly because of the economies that it represents, its responsiveness to regional campus/community needs and its undergraduate student focus.

2.8 Library impact on the education process in the future

By adapting to the rapid changes in information storage and delivery and providing teachers and students with appropriate new tools, libraries will continue to make an important impact on the education process in the future. Technologically-based learning will serve to prepare students for independent and continuous learning. Until learners are able to afford their own technology, libraries are expected to be a fundamental resource for the economically disadvantaged. Indeed libraries will be expected to provide users with the state-of-the-art technology that as individuals they will not be able to either afford or to constantly update.

2.9 Relevance to non-OECD countries

For non-OECD countries, IMHE's work on the internationalisation of higher education and professional services may offer insights related to the future of libraries. As more and more educational institutions try to become global and to offer their services all over the world, the need for new libraries of the kind described above will become pre-eminent. Among the great difficulties to be overcome is the provision of access to Internet and other digitised resources for tertiary education users and the training of the technical staff to install and maintain the equipment, provide the necessary basic information about its use and prepare teachers and learners to adapt to new modes of learning. However, decisive action on the implementation of library/information centres may keep the gap from widening and solve the problem of educating enough first-generation teachers in all disciplines.

3 Technology: Information technology and communications

Key Issues:

- *networks and distance access*
- *services and support requirements*
- *collections*
- *copyrights*
- *production and resources*
- *limits*

3.1 Evolution of university networks

Starting in the mid-1980s, universities began to develop local area networks to share central computer resources and to link them into larger and larger wide-area networks. The advent of electronic traffic controllers, particularly of routers, and the generalisation of Internet protocols (TCP/IP, ftp) eliminated most limitations for point to point connections. In the early 1990s, the managers of computing services had plans for cabling researcher workplaces, student laboratories and administrative desks to give them access to a whole range of computing resources. Meanwhile libraries built networks of their own to share cataloguing activities and to replace their card catalogues with computerised ones.

3.2 Advent of the Web

These plans had to be revised with the advent of the world-wide web and its graphical interfaces Mosaic, Netscape Explorer and others. Traffic increases exponentially, doubling every year. Today the Internet links at least 30 million computers. Most of the current human knowledge can be found there in digital form, but it is difficult to know how to access it. As we move towards a new society influenced by these changes, methods of learning as well as the role of libraries are being questioned.

According to Mariam Ginman[7]

"Networks are at the heart of a new emerging society where the relationship between students and teachers becomes more informal.

Each student is exposed to a wide spectrum of media and networks (technological and intellectual) so, the networks will redefine what a campus is.

Learning is not an isolated process but more and more a problem-based teamwork; libraries can have no status as an intellectual centre without space for study and research in the form of group working rooms, reading rooms, a 'scientific sitting room' and computer carrels."

3.3 Networked access to library systems

Many universities have installed campus-wide library access systems developed through the joint efforts of their libraries and computer departments. Tilburg University in the Netherlands, one of the first such libraries in Europe, boasts 450 PCs in its library and about 2000 around the campus, providing students and staff free access to internal and external databases as well as the Internet (Stuebing, p. 37). The University of Geneva has many departmental libraries with hundreds of PCs. The single on-line catalogue can be consulted from thousands of PCs as well as from Web pages, and books can be reserved to be physically picked up later. Similar systems can enable people to borrow books through ordinary mail for a small fee.

While some universities are developing 'virtual libraries', these do not eliminate the need for a physical space where people can carry out research with the assistance of a librarian. Indeed in a study conducted at Tilburg University, students rated the library's staff its most important factor (Geleijnse, 1997, p. 8). The notion of librarians becoming more like 'knowledge navigators' is common today. A larger societal issue with regard to the increased rate and production of information and growth of knowledge puts the library and library profession in a critical and perplexing position. For example, with limited browsing space, the level of accessibility of materials becomes both a policy decision and a potentially work intensive one. Many universities (such as The Flinders' University of South Australia and The University of Adelaide Joint Library Store) are establishing 'off-site library stores' where books can only be retrieved with a day's notice.

Ian Mowat[8] gave an in-depth analysis of the motivations for planning a new Science and Engineering Library Learning and Information Centre for the University of Edinburgh (SELLIC).

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[7] Library Director of the National Library of Health Sciences, Helsinki University, Finland.
[8] University Librarian, University of Edinburgh, UK.

"The system includes 22 libraries, including the largest university library in Europe and eight science libraries offering low level service. SELLIC aims were to integrate at least four (possibly six) libraries, to improve standards of service and to plan for 21st century requirements.

SELLIC assumptions were that

- *distance learning was not a priority;*
- *students will still come to Edinburgh because of*
  - *– the prestige of the institution,*
  - *– the attractions of the city,*
  - *– a desire to be in a community of learning,*
  - *– the profile of our students;*
- *central space is more cost effective;*
- *place-independent learning will develop quickly in theory;*
- *print will continue;*
- *there will be a greater integration of teachers and librarians.*

Desire for external funding led to competition. The award winning design draws some criticisms, highlighting the near impossibility of satisfying the competing requirements which current developments impose on library design."

The experts wondered whether the winning design's inability to meet the needs created by new information technologies corresponded to forgetting the specifications of the competition or to an incomplete list of selection criteria.

3.4 Effects of networking of libraries

Over the past decade, information technology based tools as well as networks -- especially Internet and a broad range of networks initiated by the professional library community -- have changed the programmatic requirements and organisation of the library (Michaels, 1992). Dramatic examples such as the Science, Industry and Business Branch of the New York City Public Library (SIBL) illustrate just one view of the future (*Architectural Record*, 1996). Libraries are expected to be the providers of information technology tools for their users but also must be prepared to support users with portable computers and other mobile technology (Bazillion, 1992). A case in point has to do with CD-ROM's which are now considered essential to entire branches of research in the humanities: should they be treated as books and consulted locally or be mounted on CD towers accessible through the network?

The electronic networked catalogue in combination with Internet provides a vast resource to researchers, educators and library professionals. The implication of the networked library is that its resources are limitless as it can access other libraries regionally and globally. Many libraries require a subscription to access their data bases via the Internet while many still remain free to the public. Rare and specialised collections can be researched from a distance in this way, giving the added advantage of providing, by electronic storage and retrieval, protection from excessive handling.

Ian Winkworth[9] made some important remarks regarding electronic networked libraries:

"The good traditional library has extensive collections in the fields it covers. An equally important feature is that it has ONLY those items and is very SELECTIVE -- irrelevant material is excluded. The material is also well ordered and indexed for easy retrieval.

[9] Director of Information Services at the University of Northumbria at Newcastle, he contributed to the electronic discussion forum organised by the Secretariat. The site was set up on the Internet to allow experts who could not come to the meeting to participate.

This model -- comprehensive, selective and well-ordered at the same time -- is intellectually required for electronic as for print material.

The balance between local and national/international provision will of course be different but each community of users is going to continue to need an organising force covering community interests. This does not preclude individual community members using other access channels -- just as they always have with print.

Northumbria University is joint Project Leader of a five-university consortium exploring how the hybrid library will work in social, economic and educational terms -- we believe the technology will be driven by bigger markets than education."

3.5 Virtual library

This hybrid library project called HyLiFe is part of the UK eLib (www.ukoln.ac.uk/) Electronic Libraries Programme for higher education which is building a large virtual library. A virtual library is offered by the *Bibliothèque Nationale de France*; most visible architecturally at its new location on the Seine, France's national library has digitised 100,000 volumes, 40,000 of which are free from copyright restrictions and available on the Internet at the following web site: http://www.bnf.fr/web-bnf/catalog/opale.htm.

Among the non-library organisations, one finds the Alexandria Project Digital Library (alexandria.sdc.ucsb.edu) and its distributed digital library (DL) for geographically-referenced materials. A central function of Alexandria is to provide users with access to a large amount of digital materials, ranging from maps and images to text to multimedia, in terms of geographical reference.

3.6 Copyright protection

Quite clearly there are several key issues still outstanding and open to debate. The most obvious is the issue of copyright laws and other legal protections. Trying to be fair to authors whose intellectual work can be easily copied and to publishers, legislators may burden libraries with the duty of charging their patrons for consulting their holdings, in paper or digitised form, defeating the aim of making library services essentially free and equally available to rich and poor people. Unfortunately, the present situation provides a context of uncertainty for planners and administrators.

A growing movement of academics is arguing for electronic publishing due to its broad communication ability with potential for interaction. However, some will argue that, with today's technology, copyright is increasingly difficult to protect or, conversely, overly restrictive. It may have an impact on scientific publishing as we know it today, with reviewed articles being traditionally published in academic journals after long delays while they have already been on the Internet in the form of pre-prints for everyone to see.

Such a change would put pressure on libraries to index and archive new forms of electronic documents at different stages of their evolution, leaving issues such as claims of discovery or reuse of material unresolved.

3.7 Influence on buildings, accessibility and management

In addition to electronic cataloguing, libraries rely increasingly on computers to receive, store and disseminate information. Re-shelving automation systems and self- check-in/check-out systems are in some cases thought to be experimental, while others are well advanced and refined with increased use of optical readers and other input devices. These automated systems serve several functions including data-gathering for library assessment and planning. With decentralised library facilities, new concepts of inter-library loans are emerging.

The very future of the library building itself is open to question. Some will argue that, due to the use of networks, the library building is no longer necessary and printed matter will be quickly a medium of the past. This is largely a theoretical viewpoint -- experience shows that access to documents in electronic form increases the demand by researchers for good quality printers.

Regardless of these issues, the publishing of printed matter is on the rise and new libraries appear to be becoming increasingly bigger than their predecessors. Notwithstanding this, the use of networks should not be underestimated. The requirements for change in management systems and generally within the library profession must be part of a larger vision. Technical developments in improving user accessibility continue. Such systems include inquiry and other communication with 'resource managers' by the use of e-mail as well as 'smart' systems and multi-media tutorial systems that allow the library professional and other educational professionals to focus their efforts.

3.8 Production of materials by users

Perhaps one of the under-developed areas of the use of technology in the library setting is the production of materials by users as well as the accessing of existing materials. Many academic libraries feel pressure to provide a full-service environment which allows the user to not only access materials but also to assemble this information into a variety of media forms.

3.9 Influence on budgets

Managers are finding that the increased use of information technology is having a significant effect on library budgets which is caused not only by systems and hardware, but also by training of personnel and additional technical staff costs. Collaboration with business and industry is often seen as a means of helping to reduce or share costs. Many libraries are using on-line journals and sharing with other universities to increase purchasing power and to effectively expand resources. Academic libraries are not only users of these on-line systems but can become producers of resource materials and offer subscriptions to outside users. Opportunities for revenues from library products and subscriptions require planning as well as investment in product development. In particular, micro-accounting -- collecting a small charge for each access -- may require new accounting skills to be added to the already large set of competencies required of librarians.

3.10 Selection of hardware and software

Homogeneity in the selection of hardware, software, and support services has proved vital. For example, software for cataloguing collections has proved in some cases to be a barrier to merging collections, and different schemes for subject indexing has also been an obstacle. At this point it is necessary to distinguish access to different collections through uniform protocols like Z39.50 and extended retrieval facilities which are made possible by sophisticated indexing, cross references and authority records.

A word of caution was presented by Marie Dandois[10] based on studies made in Quebec:

"There are limits to the tools of new technology:

- *The delivery system and medium currently do not guarantee a quality presentation or the reliability of data, as anyone can publish and even manipulate information on-line.*
- *The lack of structure and standardisation as well as the multiplication of specialised databases make research and the comparison of content difficult.*
- *Some publishers impose their own research system which can cause problems of compatibility.*
- *Work and reference terminals do not yet provide the versatility of hard copy documents which can be read anywhere and in any position, and much more comfortably considering their size, weight, and lack of dependency on a battery, not to mention the eye-strain caused by screens.*

In the area of human resources, library management is changing, notably due to:

- *the introduction of new responsibilities for employees who must constantly perfect their skills to keep up with technological developments;*

[10] Quebec Ministry of Education, Government of Quebec, Province of Quebec, Canada.

- *user training;*
- *the syndrome of information-overload, which can result in omitting a key word or overlooking a database (thus the importance of a librarian who targets databases by subject area).*

There are problems connected with the system itself which develop when administrators' and users' needs are identified; the uncertainty of the future slows the establishment of new information technologies."

3.11 Costs and possible solutions for non-OECD countries

Another limit to new technology is the costs involved. Cabling a whole campus is expensive. Paying for international connections is also costly. Different models could be proposed to non-OECD countries as a stop-gap measure: asymmetric communications with a low speed Internet connection one way and downloading from satellites the other way may provide a satisfactory solution if staff with the required qualifications is available at the receiving end.

4 Management: Library management

Key Issues:

- *change in profession*
- *strategy and assessment*
- *technology training*
- *nature of the organisation*

4.1 Factors of change

There is no doubt that the management of the library and, as a result, the library profession are changing. Already this paper has reviewed the many facets of the contemporary 'library'. Librarians are now concerned with a multiplicity of foci creating an almost impossible task. Library managers and computing and communication centre managers are required to work together on most issues ranging from providing unique identification of all members of the university community to some form of control of the use of networking resources.

4.2 From librarian to 'navigator'

Peter Raggett[11] gave a convincing demonstration of how the librarian became the 'navigator'; he himself organised the OECD Intranet site for library resources and developed a Virtual Reference Facility for OECD researchers. He stated:

"Faced with a rapid growth in the electronic provision of information, libraries are having to balance physical stock with electronic sources. Remote access may at first sight imply that physical space and printed stock can diminish, but there are arguments for using both methods for the gathering, archiving and dissemination of information.

Electronic sources reduce library housekeeping routines and save space, but such documents are dynamic by nature and can change or disappear without warning. There is still some user resistance to the use of electronic sources. Some of the OECD Central Library's clients have offices in remote annexes and this makes physical access to the Reading Room difficult. The Library is using more and more electronic sources and has created a 'Virtual Reference Desk'."

[11] OECD Deputy Librarian.

4.3 Identification of the needs of users and staff

Management of a modern tertiary library or learning resource centre should be based on a clear understanding of the needs of its users and staff and should regularly include evaluations. It is absolutely critical to have the support of the institution's decision-makers and necessary for the library head to be part of the institution's leadership. In some cases the library forms an integral part of the institution's corporate information and communications strategy, and all are fundamental to the academic programmes offered at these institutions. Of utmost importance is a continued, active and clearly visible support of resources and tools used by the actors of the new learning paradigms.

Dik van Ingen Schenau[12] has followed the University of Amsterdam's project to rearrange its institutional libraries, at present on 35 locations, into five large faculty libraries. The new main library building will be situated in the old centre of town. Its collections will be focused on the humanities. The library will be comprised of 1,500 study places and 700,000 volumes in open stacks. The building programme will be approximately 22,000 square metres.

The limited space in the old city-centre of Amsterdam poses constraints on the character of the building. In the present stage different models for the design are being examined and discussed. In his presentation, the author outlined a different view of the impact of new technologies on the university library:

"From 1978 to 1998 it evolved

- *from product (collection and loan) to service (information retrieval, electronic document delivery);*
- *from task orientation (input financing) to market orientation (mixed input/output financing);*
- *from scientific researchers to students (the scientist works in the laboratory or studyroom (or at home) and retrieves relevant information from anywhere on his PC);*
- *with the emergence of the Electronic Library (the scholar comes to the library as a study place, mostly independent of the library collections). The Physical Library becomes a Studyhouse.*

There are major problems dealing with storage and preservation of large collections of digitised documents, human resources management in the library and with the role of the publisher in academic publishing."

4.4 Evaluation

Cees Anton de Vries[13] suggested benchmarking on the management of higher education libraries and gave a model of a possible questionnaire to be used to this end.

"This benchmark will include the following information:

- *numbers of students at the institution, library staff and library visitors;*
- *average length of time per visit;*
- *percentage of people who use the index, borrow books, read or work, and access the Internet;*
- *opening hours;*
- *annual research budget;*
- *library surface area and shelf space;*

[12] Vice-President for Information Technology, Universiteit van Amsterdam, College van Bestuur, Spui, Netherlands.
[13] Architect from the Netherlands, expert on several new architectural projects.

- *numbers of work stations, computers, and help desks or counters;*
- *any new activities of the library (publishing, consultancy, information services, etc.)."*

4.5 Possibilities for out-sourcing

The management of technology-based systems requires comparing the benefits of out-sourcing maintenance and controls with the opportunities of developing an in-house team. Nevertheless, computer instruction and training is increasingly required for library staff, students and teachers. Managing the library also requires the development of a continuous personnel re-training programme. The concepts of a 'learning' organisation are most relevant in the academic library setting and communicating these needs to the institution's top management may be the most difficult mission.

Increasing operating budgets appears to be necessary in these dynamic, technology driven environments. While automation may signal to institutional directors an opportunity to down-scale personnel requirements, the need for highly skilled professionals in the library setting coupled with increased usage are contrary to reducing operating budgets.

4.6 Providing support to the users of computer systems

Librarians are increasingly expected to provide technical support to users, help maintain computer systems and participate in international networking. Potentially less attention is required to survey against vandalism (although stealing a CD-ROM, a disk drive or even memory chips does occur). Buildings can be designed with more open space allowing greater visibility whilst technology-based surveillance and alarm systems help to replace the 'eyes and ears' of the librarian. Self-service circulation systems also contribute to the changing role of the librarian (Tilburg, 1992).

4.7 Centralisation vs. decentralisation

On the question of centralised versus decentralised solutions, Raf Dekeyser[14] gave a series of arguments for centralisation in the digital era based on a university which has a central library (local deposit library, general publications), four campus library services (Humanities, Behavioural Sciences, Biomedical and Exact Sciences) and where each campus has several sectional libraries (in faculties or departments).

"The Exact Sciences comprises mathematics and computer sciences, physics, chemistry, botany and agronomy, zoology, geo-sciences (part of geography and geology), social and economical geography, chemical engineering, architecture, town planning, construction, electronic engineering, metal sciences and applied material sciences, mechanical engineering.

There are 12 libraries, each staffed by one librarian, plus many small library units without staff. The campus library services include acquisition, cataloguing and inter-library loans. It holds 430,000 volumes, 3,050 journals and handles 7,500 incoming and 6,500 outgoing inter-library loan requests a year. There are 20 km of bookshelves, with 445 seats for 5,000 students and 1,200 academic staff.

The arguments for continuation of the present situation were general satisfaction with the present system, the short walking distance between the library and the office, an engagement in the acquisition budget, familiarity of the librarian with his customers, and facilities for access (private keys to library door!).

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[14] Chief Librarian, Katholieke Universiteit Leuven, Leuven, Belgium.

The arguments for centralisation were the interdisciplinarity of sciences; that individual research libraries forget their didactic mission; and that small understaffed libraries mean limited opening hours, often closed for holidays and no specialised services. One expects better external services and smooth implementation of modern media; larger distances will be compensated by decentralised electronic information delivery. There are also more possibilities for expansion and improved 'visibility' of the campus.

The new concept is to organise clusters around didactic and general reference works; biosciences (agronomy, botany and zoology); mathematics, computer sciences, electronic and mechanical engineering; chemistry, physics, astronomy and material sciences, geology; and architecture, construction and geography.

The disposition of the collection will see 250,000 recent works in open stacks, plus less recent books and journals for a compact system of 400,000 volumes. For older works, there will be a depot, eventually at some distance, for 400,000 volumes with a continuous flow system.

Further desiderata to be satisfied include the extension of the number of seats, an instruction room with multimedia applications, diverse and specialised staff, late opening hours and weekend service."

4.8 Opening hours

With library services becoming more focused on improving access and user support, they may opt for longer opening hours, in addition to 24-hour on-line access. Catering to group work by people working late in the evening poses a problem with regard to buildings. Answering questions submitted via e-mail may be done by agents working on behalf of the library but in alternative locations.

5 Architecture: Library facility planning, design and management

Key Issues:

- *purpose*
- *image*
- *site*
- *organisation*
- *programme*
- *flexibility*

5.1 Basis for planning new libraries

The historic role, new student needs and desired future services are the bases for ongoing planning for the library. Increasingly, the role and image of the library are the key to the strategic plan and vision for the parent educational institution itself[15]. With the integration of networked services, this vision and its image combine both the physical and virtual. The resulting design and programmatic requirements include issues such as: the size and adaptability of the library; multi-functional purpose; administrative functional zones; security; and provision of information and communication technology (ICT) access zones.

The experts from architecture convinced the meeting that the library had a bigger role than providing facilities to access information. Frédéric Levrat[16] asserted that:

[15] Several examples of recently completed university libraries support this statement, for example the Delft University of Technology Library (Netherlands), opened in 1998. The library is designed as an 'image' for the university.

[16] Teaches at Columbia University in New York and is co-author, with Peter Eisenman, of a design for a

"Our perception of the world is slowly moving away from our direct experience of situations and is being replaced by mediated information... A virtual world has emerged, one that has moved away from the anthropomorphic dimension of the body, with data processors feeding us with assimilated time and space sequences.

If the mechanical paradigm of the 1930's was easy to incorporate into a process of materialisation, the dematerialisation of space, the dislocation of time and the infinite scales of virtual reality have brought architecture and the architect to a degree where both seem to have no easy answers. In a society of communication, ... Peter Eisenman has argued that architecture should not be concerned only with aesthetic, economical or functional criteria, but rather with understanding a new condition of being in the digital age.

Traditional technology gave us the means to shelter ourselves from the rain, cold, and heat, but architecture must now shelter us from conceptual reality, virtual reality and the multi-dimensional environment. New technology always presents us with friendly and positive images. It is a technology of computation and management of data, processing as fast as one million bits per second. Ultimately, it is important that we are able to decode such mediated information and to relate it to our 'real' world.

The material of the library, its collection of books and maps, has lost its stability in the dimension of paper. The library, our symbol of the memory of our civilisation, is beginning to dematerialise this structure of information, with documents migrating from one source of information to another. The model of the library acts as the model of a connector of information."

Mr. Levrat presented designs of the future library of the Graduate Institute of International Studies in Geneva, Switzerland; the projected building shows how the main floor of the library, accessible from the entrance ramp, acts as one of these connectors, whereas the access to knowledge and exchange of information is suspended above a public passageway and visually connected to the reading rooms below.

The participants at the meeting had the privilege to visit the new library of the Paris VIII University in Saint-Denis, not yet open to the public, where the connecting role of the library was even more evident since it links the two halves of the campus, hosting a passageway above a busy street right in its middle. During the discussions, it became obvious that new library buildings could be built to become the focal point of the university of tomorrow, projecting an image mixing tradition and modernism, offering access to books and to the digitised world, embodying the very purpose of institutions of higher learning of tomorrow. Contributing to the discussion through the Internet, Kenneth Dowlin[17] wrote:

"Designing tomorrow's library building is more of a challenge now than perhaps ever before. A major project like the San Francisco Public Library (for which I led the design, the funding, and the creation) took nine years from start to finish. The Internet wasn't even started and the public excitement for access via libraries was only talked about. I did discuss the possibility of something like the Internet in my book The Electronic Library *in 1984 and was able to incorporate architectural elements into the building based on my experience and predictions.*

In the discussion points the issue is raised that major library buildings become Icons. I agree with that, again relating to my experience in San Francisco. I do have a question though: What is the icon for the electronic communication age and how is it incorporated into a building?

The comment about the 'cathedral' like setting for the traditional library is good. Do you remember when the picture of the 'cathedral' library was on the front of the college catalogue in many schools? What do they put there now?"

---

new library for the Graduate Institute of International Studies in Geneva.

[17] Distinguished Visiting Professor at the School of Library and Information Science at San Jose State University in the California State University system.

As more information is being stored electronically, less library space may be needed for shelves. However, with rising student numbers more space is required for duplicates of specialised collections (especially for course provision at the undergraduate level) and for computers and printers. Each library must take into consideration the types of materials it needs to have on hand; paper copies are needed of books which are read from cover to cover (primary literature and social science works), whereas encyclopaedias and perhaps some science texts can be easily accessed on CD-ROM's.

5.2 Relationship with the surrounding community

The OECD Programme for Institutional Management in Higher Education (IMHE) is currently concerned with higher education institutions' response to regional needs which can also be a key issue of change with regard to library design. While the classic academic library has been considered a 'hallowed and privileged sanctuary', changes in educational institutions' self-image have also signalled a significant change with a more open and even inviting relationship with the surrounding community. These mixed-service relationships are also key considerations in planning, particularly regarding site selection, accessibility (time and physical), security, ancillary spaces (lecture halls) as well as technology access. One motivation for sharing space with the community and/or other institutions is to reduce or share costs. Some examples include Australia's University of Adelaide Waite Campus and the University of South Queensland's Wide Bay Campus (*PEB Exchange 32*, pp. 12-17).

Helena Bandeira Bras[18] noted that:

"The search for alternatives to traditional methods of teaching and learning -- books and lectures -- leads to publishing and copying pictures, projecting slides and films, showing video tapes, listening to music and interviews, giving explanations by theme, etc.

Thus the necessity arises to organise all these new forms of teaching by analysing and consolidating them in such a way that professors and students, individually or in groups, enjoy doing research and consulting reference materials, and are led to produce documents in various forms and mediums, creating new resources.

The information thus obtained, incorporating thematic groups of documents into printed, audio-visual or electronic form, and concentrated in one single space for consultation can be used by several levels of classes at once. In such a way, horizontal and vertical connections can be made, as well as connections between different subjects, both within the curriculum and extra-curricular."

5.3 From academic libraries to 'learning centres'

Inspired visions for a library may result in its functional re-framing to a 'learning centre' or even a 'community centre'. A report on innovative libraries published by the Institute of Advanced Architectural Studies at The University of York suggests a dramatic break from the traditional library environment. It recommends that libraries devote a large amount of their space to "computer terminals, small group work areas, coffee bars and relaxing areas to support face-to-face discussion, with both collections and circulation materials placed in high-intensity storage" (Taylor, 1995, p. 1). The Adsetts Centre, for example, includes media production in addition to library services, computing provision and a Learning and Teaching Institute. The Hague's central library houses a music department, and the San Francisco Public Library incorporates cultural centres for several ethnic groups.

[18] Architect, Ministry of Education, Lisbon, Portugal.

5.4 Concerns about the dilution of the traditional role of libraries

What is the future of the traditional institution and what will it mean for buildings? "The current UNESCO consultations with student organisations bring out a much wider range of interests and concerns. These students are uneasy over the diminution of a vision: the traditional model of the university as a community of scholars gathered together in the pursuit of truth and the common goal giving way to service station, cafeteria and revolving door models of higher education" (OECD, 1997, p. 55).

5.5 Continuous evaluation of building appropriateness

In addition to developing a future vision, the evaluation of current conditions and design appropriateness requires some continuous and systemic form of assessment. The use of information and communication technology can provide a dynamic form of ongoing information which is now standardised in many state-of-the-art library settings. For more detailed and focused planning information, a post occupancy evaluation (POE) process (*PEB Exchange 32*, pp. 18-21) or a similar assessment (Lushington, 1993) could be used to benchmark and to determine which services to provide.

"A significant weakness in many procedures for quality assurance in common use is that little practical use is found for much of the data produced" (OECD, 1997, p. 76). Why are facilities never measured in the quality rounds? Does PEB want these to be measured? How can PEB make this happen?

The 'Thematic Review of the First Years of Tertiary Education' (OECD, 1997, p. 7) found that "As expansion continues, ever greater demands for resources can be expected. The two targets are to improve efficiency, thereby lowering costs without sacrificing quality, and mobilising resources on a community wide basis". What performance measures can be put in place by PEB to measure the relationship between facilities and educational outcomes?

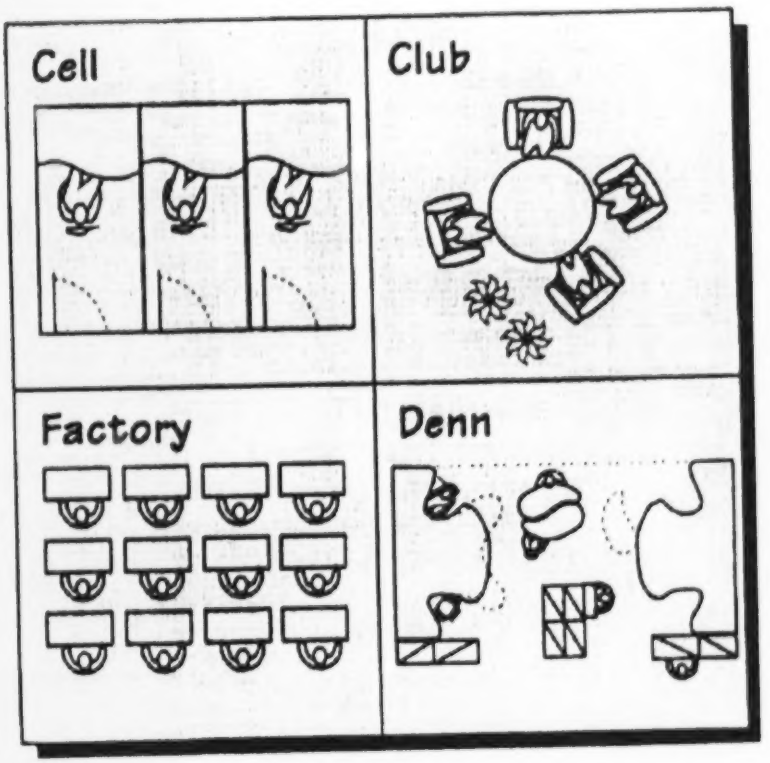
5.6 Available models

Some of the key detailed design concerns include location and organisation of work areas, lighting and mechanical services, security and general ambience. Future planning should take into account successful and well as unsuccessful uses of lighting, ventilation, acoustic isolation, orientation and access. On the whole, library buildings are moving toward a more vibrant and welcoming atmosphere (including accessibility for those less abled) using natural light and quality materials, with flexibility for future growth.

Some of the case studies present quite bipolar positions -- from the idea of a virtual library which is almost a reality at the heavily research-oriented OECD, to the University of Stockholm which used its library project as a means of rejuvenating the campus and providing a major social, communications, knowledge and interactive centre linking other previously disaggregated buildings on the campus.

5.7 Designing for flexibility

The following diagrams, from TG Learning Facilities in the Netherlands and DEGW in London, were presented at the meeting by Cees Anton de Vries.



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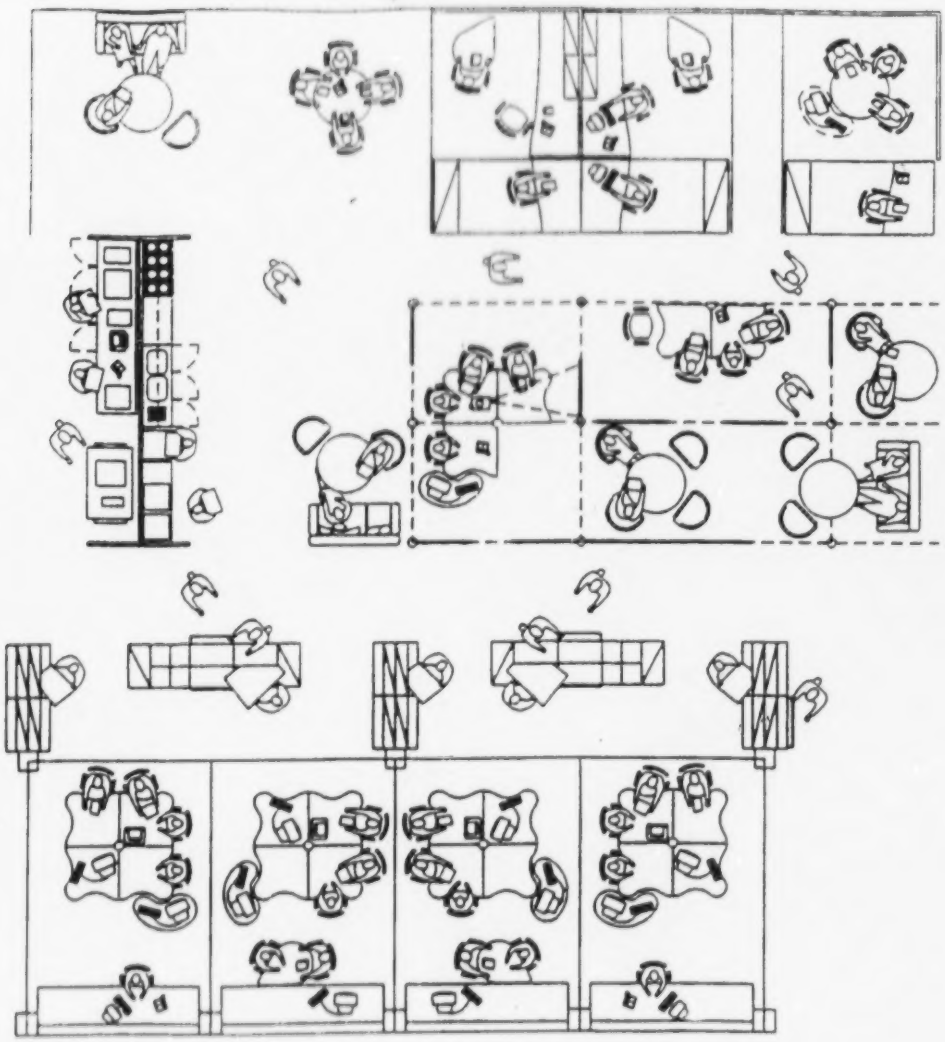

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Recommendations

Learning methods

- Libraries will remain an integral part of tertiary institutions, far from disappearing in favour of a 'virtual' knowledge world where individual workstations give unlimited access to unorganised material, they will see their mission enlarged as access points where users can receive guidance towards useful information. Books do not show signs of disappearing. New missions regarding access to digitised forms of information will be added to the traditional tasks of libraries. With a generalised access of library catalogues (OPAC) on the Internet, the demand for inter-library loans is bound to increase, with possible changes of policy to accommodate the demand.
- New ways of teaching and 'learner-centred' courses, together with distance delivery, present the danger of restricting the horizon of learners to the size of their screens. Libraries are seen as a place where people can come and work together in a friendly environment. The design and management of libraries should take into account the requirements of extra space and equipment for individual workplaces, wired for personal computers or equipped with workstations, as well as small rooms for groups to work together while accessing the Internet or other digitised resources (CD-ROMS) and printed material.
- The advent of flexible and open (distance) learning will increase the potential number of users of libraries. The new generations of students will expect great flexibility in opening hours, easy access and the availability of hardware and software resources. To meet the 'social' needs of distance learners, libraries may have to open branches in different places in the form of multi-service centres providing 'one-stop shopping' where books, workstations, counselling and tutoring would be available. The costs, proportionate to the new range of services, could be shared by local communities.
- The library is a good place for providing study facilities and technology tools to students. Its staff is trained to help people while preserving precious resources. It can inspire loyalty from its users and a strong feeling of institutional identity. While the role of libraries will shift from supporting research to supporting users, it cannot be expected, however, to provide all information access points needed in an institution.
- The new roles of libraries in the learning process will require programmes of professional development for the staff and training for the users. The resistance to change should not be underestimated.

Technology

- In exact sciences, libraries whose sole purpose is to organise the acquisition and circulation of scientific journals will become obsolete since most scientists will access the most recent papers from their workstations. Indexing, archiving and retrieving will remain but can become a global task of a central library unit. General purpose libraries, possibly decentralised, will offer reference books, CD-ROMS, workstations, workspace and guidance to less-specialised users. Because of the multi-disciplinary nature of current research, they will remain useful to researchers as well as to students.
- There are great uncertainties in the way new emerging technologies will affect the use of libraries. Hardware and software developments keep a breath-taking pace. As multi-media stations become more user-friendly, the space devoted to traditional reading rooms may decrease for the benefit of workplaces equipped with computers or with plugs for connecting users' own machines. More square meters are required by users. In view of the recognised need for the social role of libraries, library buildings should accommodate different work and leisure areas.
- The number of books and journals published continues to grow. Due to copyright barriers, it may be impossible for libraries to generalise access to on-line versions. With the exception of the collections of scientific journals, the other sectors of libraries will continue to grow at the current rate. Where on-line versions are available, adequate printing facilities must be foreseen as users usually print the articles which interest them.

- University libraries and computing services should work hand in hand in acquiring and maintaining hardware and software resources for end users. Support for multiple platforms is a necessity. Libraries will not have the necessary resources to cope by themselves with changes that will affect the whole academic community.

Management

- Operating costs will be driven by decisions on copyright and by publisher's policy on electronic material. Opening longer hours and to a wider public implies that attention should be paid to the layout of premises to facilitate good supervision with a somewhat reduced staff. Protection of stock and equipment should also be guaranteed.
- Digitisation of unique resources has to be undertaken on a co-ordinated national or even international basis, with libraries making sure that they will not have to pay to access their own treasures.
- At a time when libraries are asked to do more, it is necessary to re-assert their traditional role of preserving the cultural heritage and keeping up-to-date their post-graduate collections.
- The organisation in central collections (such as exist at most universities) with dispersed discipline collections (such as at Oxford) is a matter of geography and convenience of access; advantages and disadvantages of both models have to be studied for each case.
- Decentralised libraries can easily maintain a union-catalogue of their holdings and facilitate inter-library loans. In the case of undergraduate libraries, it is envisioned that only reference and frequently requested books be kept locally, the role of the library being to provide access to information in all forms.
- Some sort of evaluation should be possible to see how well different models of libraries meet the expectations of their planners and users. It is particularly important in cases where sine functions have been out-sourced to give the staff a chance to play a role in organising the access to knowledge in the information society of tomorrow.

Facilities

- New buildings are needed, conforming to new models of the role of libraries in a student-centred learning environment. They will probably require more space per user than the reference libraries which paid more attention to storing books than to the comfort of their users. Further, the great majority of libraries in tertiary education are already existing, pointing to the need for a major rethinking of how the physical fabric can be adapted to house the new library services and technologies.
- New libraries should be built for people, with accessible collections and socialisation programs including coffee shops, areas for relaxing and spaces for independent study and group work. The image of the library can change from introverted to extroverted through organised interfaces with the community.
- The administration of a university with a new library should prepare a brief which outlines the needs and the vision of its library with details defining consultation, information and orientation.
- Savings in maintenance costs may imply higher investment costs.
- Flexibility is a goal in itself with cabling of every building and the possibility to change the use of space: the lifetime of buildings is 30 to 150 years while technology changes substantially every five years.
- The place the library occupies, both the physical space and the role it plays, will grow as universities increasingly welcome students of all ages for research, independent study and life-long learning.

Future research

From the experts meeting, several themes could be identified for further research and dissemination. They include:

- a survey of current changes in tertiary education libraries to better understand the rate of change and key trends which are taking place;
- models and typology for tertiary education libraries particularly focusing on trends with the use of ICT;
- costs study focusing on the implementation of information technology and supporting costs (professional development) in comparison with construction costs for new facilities;
- briefing information: developing a profile of types of library briefs for new and renovated buildings and for new and updated technology plans.

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